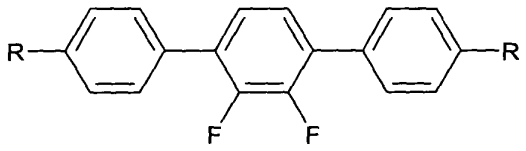
Patent Claims

1. A liquid-crystalline medium having a dielectric anisotropy $\Delta\varepsilon$ of ≥ 3, comprising compounds of formula (I)



(I)

in which

R, independently of one another, are each an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent.

2. A liquid-crystalline medium according to Claim 1, comprising:

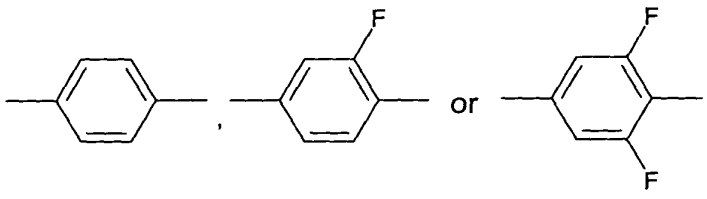
a) 1 to 50% by weight of one or more compounds of formula (I);

b) 5 to 90% by weight of one or more compounds of formulae (II) to (V)

R - a - b - Z - c - X (II)

in which

a, b and c, independently of one another, can be



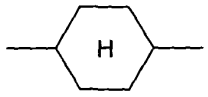
R is an alkyl, alkoxy or alkenyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively, in which one or more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent,

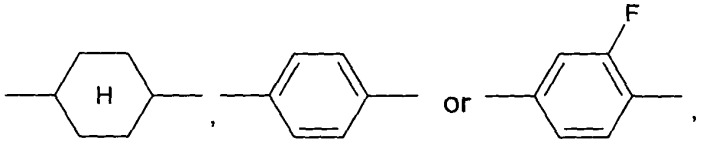
X is -F, $-OCF_3$, $-OCF_2H$, -Cl or $-CF_3$, and

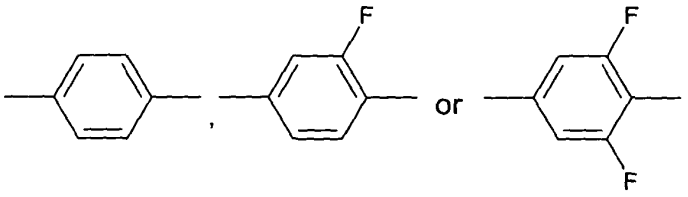
Z is a single bond or $-CH_2-CH_2-$;

R - d - e - f - X (III)

in which

d is 

e is 

f is 

and X and R are as defined above;

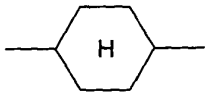
R - e - f - X (IV)

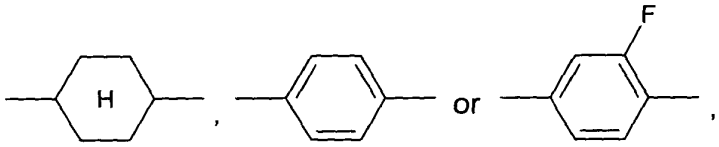
in which

e, f, R and X are as defined above;

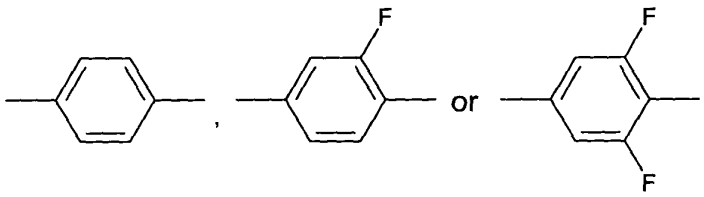
R - g - h - i - j - X (V)

in which

g is 

h is 

i and j are each independently

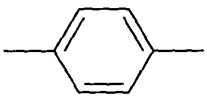


and R and X are as defined above;

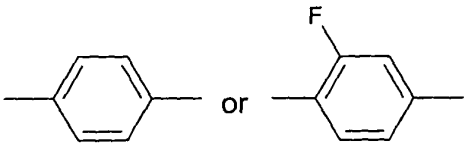
c) 0 to 30% by weight of one or more compounds of formula (VI)

$$R - k - l - m - R^1 \qquad (VI)$$

in which

k is 

l and m, independently of one another, can be



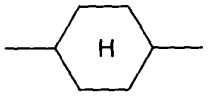
R is as defined above, and

R^1, is -F, -Cl, or an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent;

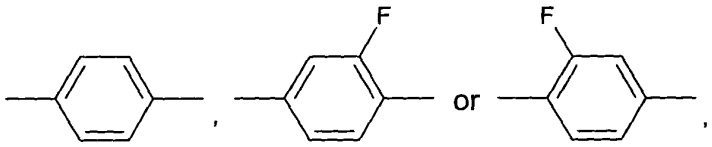
d) 0 to 30% by weight of one or more compounds of formula (VII)

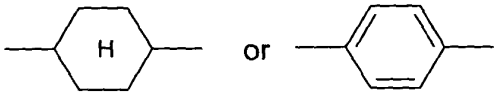
R - n - o - p - q - R (VII)

in which

n is  ,

o and p are each independently

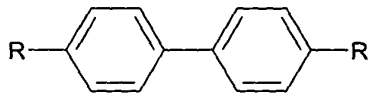
 ,

q is 

and

R are independent of one another and are as defined above; and

e) 0 to 40% by weight of one or more compounds of formulae (VIII), (IX) and/or (X)



(VIII)

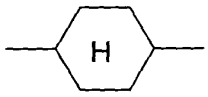
in which

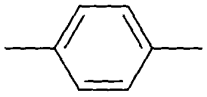
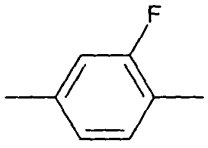
R are independent of one another and are as defined above,

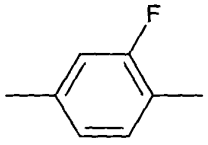
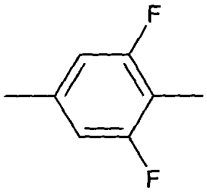
$R - r - s - t - R^2$ (IX)

$R - r - s - t - u - F$ (X)

in which

r and s are each independently 

t can be  or  ,

u is  or  ,

R is as defined above, and

R^2, is -F or an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or

more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent;

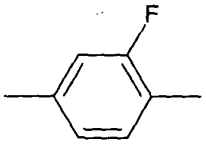
where the sum of components a) to e) is 100% by weight.

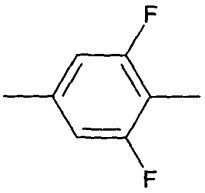
3. A liquid-crystalline medium according to Claim 1 or 2, wherein compounds of formula (II) are selected from the following compounds of (IIa) to (IIg)

R - P - G - U - X	(IIa)
R - P - G - G - X	(IIb)
R - G - G - G - X	(IIc)
R - G - G - U - X	(IId)
R - G - G - P - X	(IIe)
R - G - P - G - X	(IIf)
R - G - P - E - P - X	(IIg)

in which

P is 

G is 

U is 

E is $-CH_2-CH_2-$.

4. A liquid-crystalline medium according to one of Claims 1 to 3, wherein compounds of formulae (III) to (V) are selected from the

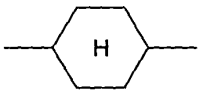
following compounds of formulae (IIIa) to (IIIf), (IVa) to (IVf) and (Va) to (Vd), respectively,

R - C - P - G - X	(IIIa)
R - C - P - U - X	(IIIb)
R - C - C - G - X	(IIIc)
R - C - C - U - X	(IIId)
R - C - G - U - X	(IIIe)
R - C - G - G - X	(IIIf)

R - G - U - X	(IVa)
R - G - G - X	(IVb)
R - P - U - X	(IVc)
R - C - P - X	(IVd)
R - C - G - X	(IVe)
R - C - U - X	(IVf)

R - C - C - P - U - X	(Va)
R - C - P - G - U - X	(Vb)
R - C - P - G - G - X	(Vc)
R - C - C - G - U - X	(Vd)

in which

C is 

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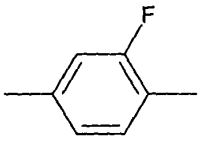
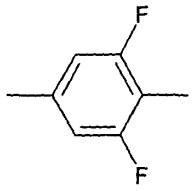
P is 
,

G is 

, and

U is 

5. A liquid-crystalline medium according to Claim 3 or 4, wherein, in the formulae (II) to (V),

R is an alkyl radical having from 1 to 7 carbon atoms, and

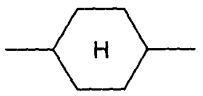
X is -F or -Cl.

6. A liquid-crystalline medium according to one of Claims 1 to 5, wherein the compounds of formulae (VI) and (VII) are selected from the following compounds of the (VIa) to (VIc) and (VIIa) to (VIIg), respectively,

R - P - Gl - Gl - F	(VIa)
R - P - Gl - Gl - Cl	(VIb)
R - P - G - P - R	(VIc)
R - C - P - P - C - R	(VIIa)
R - C - G - P - C - R	(VIIb)
R - C - P - G - P - R	(VIIc)
R - C - P - Gl - P - R	(VIId)
R - C - G - P - P - R	(VIIe)
R - C - Gl - P - P - R	(VIIf)
R - C - Gl - P - C - R	(VIIg)

in which

R are each independent of one another,

C is 

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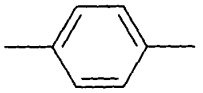
P is 
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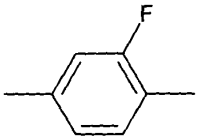
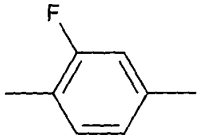
G is 

, and

Gl is 

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7. A liquid-crystalline medium according to Claim 6, wherein R in the formulae (VI) and (VII) is an alkyl radical having from 1 to 7 carbon atoms.

8. A liquid-crystalline medium according to one of Claims 1 to 7, comprising

a) 1 to 50% by weight of one or more compounds of formula (I),

b) 5 to 90% by weight of one or more compounds of formulae (II) to (V),

c) 0 to 30% by weight of one or more compounds of formula (VI),

d) 0 to 20% by weight of one or more compounds of formula (VII),

e) 0 to 50% by weight of one or more compounds of formulae (VIII), (IX) and/or (X),

where the sum of components a) to e) is 100% by weight.

9. A liquid-crystalline medium according to Claim 8, wherein component b) comprises,

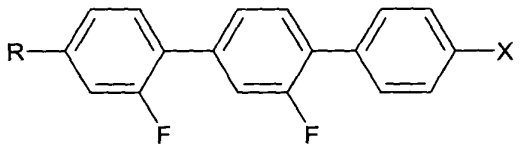
b1) 20 to 80% by weight of one or more compounds of formula (II), and

b2) 80 to 20% by weight of one or more compounds of formulae (III) to (V),

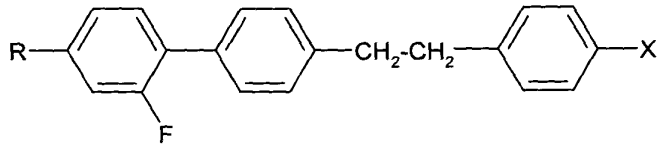
where the sum of components b1) and b2) is 100% by weight.

10. A liquid-crystalline medium according to one of Claims 1 to 9, comprising

i) as compounds of formula (II), compounds of formulae (IIe) and/or (IIg)



(IIe)

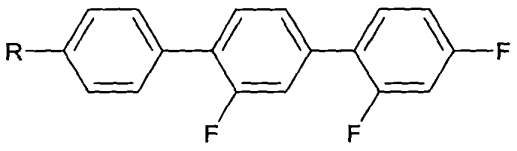


(IIg)

in which

R is an alkyl radical having 1-7 carbon atoms, and X is Cl;

ii) as compounds of formula (VI), compounds of the formula (VIa)

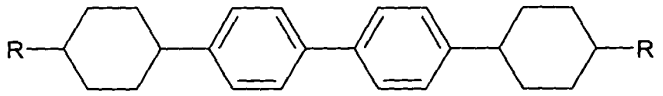


(VIa)

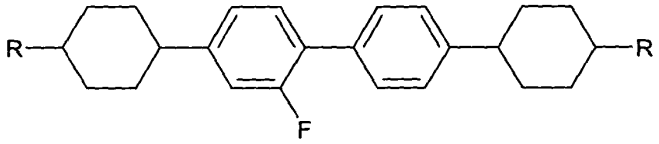
in which

R is an alkyl radical having 1-7 carbon atoms;

d) as compounds of formula (VII), compounds of formulae (VIIa) and/or (VIIb)



(VIIa)

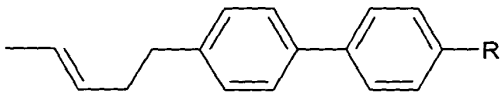


(VIIb)

in which

R is an alkyl radical having 1-7 carbon atoms; and

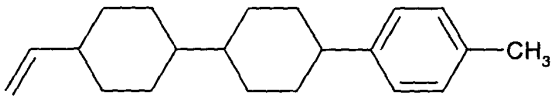
e) as compounds of formulae (VIII), (IX) and/or (X), one or more of the compounds of formulae (VIIa), (IXa), (IXb) and (Xa)

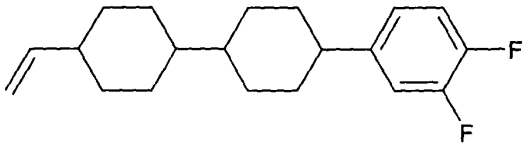


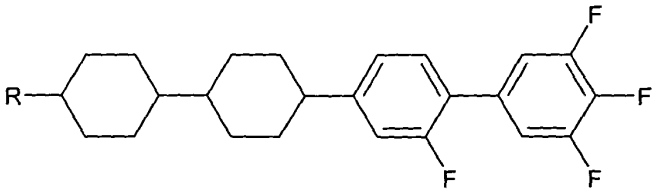
(VIIIa)

in which

R is an alkyl radical having from 1 to 7 carbon atoms,


(IXa)


(IXb)


(Xa)

in which

R is an alkyl radical having 1-7 carbon atoms.

11. A liquid-crystalline medium according to Claim 10, consisting essentially of compounds of the formulae

a) (I)
b) (IIe) and/or (IIg)
c) (VIa)
d) (VIIa) and/or (VIIb)
e) (VIII), (IXa), (IXb) and/or (Xa).

12. A liquid-crystalline medium according to Claim 11, consisting essentially of:

a) 1 - 50% by weight of one or more compounds of the formula (I),
b1) 5 - 50% by weight of one or more compounds of the formula (IIe),
b2) 5 - 50% by weight of one or more compounds of the formula (IIg),
c) 0 - 30% by weight of one or more compounds of the formula (VIa),

d) 0 - 20% by weight of one or more compounds of the formulae (VIIa) and/or (VIIb),

e1) 0 - 40% by weight of one or more compounds of the formula (VIIIa),

e2) 0 - 40% by weight of one or more compounds of the formulae (IXa) and/or (IXb), and

e3) 0 - 25% by weight of one or more compounds of the formula (Xa).

13. A liquid-crystalline medium according to Claim 12, consisting essentially of:

a) 5 - 50% by weight of one or more compounds of the formula (I),

b1) 10 - 40% by weight of one or more compounds of the formula (IIe),

b2) 10 - 40% by weight of one or more compounds of the formula (IIg),

c) 2 - 20% by weight of one or more compounds of the formula (VIa),

d) 2 - 15% by weight of one or more compounds of the formulae (VIIa) and/or (VIIb),

e1) 5 - 20% by weight of one or more compounds of the formula (VIIIa),

e2) 5 - 30% by weight of one or more compounds of the formulae (IXa) and/or (IXb), and

e3) 2 - 20% by weight of one or more compounds of the formula (Xa).

14. In electro-optical display element containing a liquid-crystalline medium, the improvement wherein said medium is according to one of Claims 1 to 13.